

AVIATION

The Oldest American Aeronautical Magazine

JUNE 9, 1924

Issued Weekly

PRICE 10 CENTS



Airplane view of the Olympic Stadium at Colombes, France

VOLUME
XVI

SPECIAL FEATURES

NUMBER

23

COMMERCIAL AIR PILOTS ORGANIZE
THE PIONEER EARTH INDUCTOR COMPASS
BRITISH DEVELOP AUTOMATIC CAMBER GEAR
HOW GOODYEAR III WON THE SAN ANTONIO RACE

GARDNER PUBLISHING CO., INC.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK



AIR MAIL PLANE WITH NEW LOENING WINGS

The American DH type plane with Liberty motor is generally conceded to be a fine flying machine, so that the achievement by the Loening engineers of a very decided improvement in the speed range, climb and maneuverability of this machine is proof of the thorough and precise engineering of an organization with a versatile experience in building all types of airplanes.

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51ST STREET AND EAST RIVER, NEW YORK

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JUNE 9, 1924

AVIATION

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AVIATION

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British Air Crashes

RECENTLY some very accurate information has been circulated regarding British air crashes for Aviation published in its issue of April 29 a note headed "Monthly Record of British Air Crashes" which C. G. Gray of The Aeroplane states is incorrect in almost every particular.

In this connection, "The Air Force has made no attempt whatever to develop statistics or maintain capable of equaling the speed made by American magazines. Our only attempt at speed machines have been made by private enterprise. Our fastest Service machine does a time 150 mi. (for the Service machine table in this week's issue). One of our speed machines, the Sopwith Hawk, crashed after the Aerial Derby and before the Schneider Cup Race last year, but the pilot was unhurt. No accidents, Service or Civil, have happened on speed machines.

"Not one of the R.A.F. machines was on a fast machine even as late as 1933. All of them were old Service machines of various design and construction (Bristol Fighters, DH.9As, Sopwits and Avrocs), with the exception of one solitary experimental all-metal two-seater fighter machine which crashed at the experimental station at Martlesham Heath.

"The Aeronautical Research Committee is not trying the Air Ministry to investigate engine failures. Very few of the accidents were due to engine failures and, in any case, there is more than enough technical investigation engine and engine design every day and all day. And the Aeronautical Research Committee has nothing to say on the subject except to say—

"In proportion to the number of machines and pilots employed, and the number of miles flown, the percentage of fatal accidents in the R.A.F. is very considerably lower than the proportion of fatal accidents to British passenger machines. There are 24 Civil pilots and about 2000 Service pilots.

"The Air Ministry has not proposed in Parliament an investigation of all flying accidents. The reason why it has not done so is simply that any time the early days of the war, there has been a permanent Accidents Committee, as a regular department of the Air Ministry, and the duty of that Committee has been to investigate the cause of every accident. Since Civil Aviation was introduced in 1919, the duties of that Committee have included the investigation of all Civil Aviation accidents, as well as Service accidents. Formerly civilian accidents were investigated by the Royal Aero Club. The Accident Committee (Air Ministry) does not publish reports on its accidents because in many cases it is impossible to find out the cause of the accident, and publication of that the Committee believes to be the cause of the accident would be a good many cases if it open to an action for libel by the manufacturer of the machine or engine or by the pilot of the machine. I imagine the latter because a good many accidents in Civil Aviation have been due to bad maintenance.

"The majority of the accidents both in the Air Force and in Civil Aviation, both fatal and otherwise, have not been due to engine failure or to defective construction of the machine, but simply due to bad judgment or carelessness on the part of the pilot. It is possible to design an airplane which even the most careless or clumsy pilot cannot cause to stall and nosedive, or sideways and spin, in the ground. Hence day we shall have such machines and the death rate will decrease accordingly. But no long as the Service and Civil Aviation authorities are content to permit the use of machines which depend on the skill and judgment of the pilot, then an accident which is due to a mistake by the pilot can only be avoided by vigilance and cannot be blamed on designers and constructors."

Who is to Blame for Our Air Impotence?

IT seems an odd idea to be playing for anyone is impotent. To say a good word for Congress, but not of fumes and not the statements that are being made continually come further harm, the real situation should be understood.

Appropriation bills are prepared very differently now than in the past. First there is the Departmental budget. The Bureau of Aeronautics tries to get all it can from the officers of the Navy charged with preparing the budget. Usually it is told to limit the appropriation for the Naval Air Service to the same amount as the previous year, regardless of the growing importance of aircraft, with the fact. In the War Department the Air Service is all extended in the command of the Chief of Staff, Cavalry and other branches for more funds. It is also usually limited to the same amount as the previous year. Notwithstanding all of the promises and promises of Admiral Moffett and General Patrick for a larger appropriation, the Secretaries read their own estimates to the Director of the Budget. From that point on there is little hope for increases. The estimates then go to Congress, but the Chiefs of the Air Services are disappointed from asking for more. Their statements at the hearings are therefore merely preliminary or for as any hope for added appropriations is concerned. Finally the Military and Naval Affairs Committee hold the hearings, but not the Appropriations Committee is handling all hearings on appropriations. And aside from a natural disposition to not appropriations, it is only due to Congress to state that during every year there has been a Budget, Congress has appropriated the money requested by the Secretaries.

So, why continue the popular but ignored practice of blaming our air impotence on Congress? It has enough blame to carry without this. In fact, the blame rests squarely on the Departments themselves, and if necessary is regarded of such major importance, that why blame Congress for small appropriations?

The Huff-Daland Petrel 4 and TW5 Airplanes

Good Performance and Simple Maintenance Characterize these Wright-Engined Cantilever Biplanes

Huff-Daland & Co. of Ogdensburg, N. Y. have just announced the completion of official trials and service tests of their new Petrel Model 4 and of their TW5 Training Plane. Five planes of the latter type have recently been delivered to the Army Air Service at Brooks Field, Tex. As the two types are identical except for the engine, single-seat Petrel consists of the TW5 and for the different performance due to variation in the useful load, the description of the Petrel which follows will, at the same time, cover the structural features of the TW5 Training Plane.

Representing a development and refinement of the original Huff-Daland cantilever biplane of 1921 and 1922, and retaining the same features of simplicity and ease of maintenance

and exposure is reduced to the simple matter of cable inspection and the proper covering of exposed parts with paint. Latent of tubes are coated with a protective enamel and are hermetically sealed as a further precaution against possible rust. Slender pipes and fittings are reinforced with steel tape straps, welded in place, and designed for the most severe factor to remove the possibility of cracks or lines consequent vibration.

Landing Gear

A steel tubular under carriage of the tripod type is used, drawing down with a "breech-like wheel axle" and relying to a large extent the possibility of seeing over when it is in

landed. It is extremely simple, the upper wing being secured by four tie rods, one in front and rear flying wires, which are already assembled in place, while the lower wing is raised into the fuselage struts and with the use of four tie rods, securely drawn to its seat. The struts are thus locked in place, the whole structure having been adjusted to the fuselage, and requiring no adjustment in the field. All struts are painted to avoid rust in assembly by untrained personnel.

Control Surfaces

Ailerons are balanced and washed-out at the tips as in the original Petrel design, in order to accommodate the definite and sensitive control. They are mounted on longer tabs extending to the full length and carrying through to struts located near the center of the wing, which are actuated by push and pull cranks, connecting to cranks on torque tubes and stock control. It has been found that the elimination of wires in this manner is necessary for an unusually smooth and delicate control, and at the same time avoiding the complexity of constant inspection of pulleys and cables in service use.

The aileron is balanced, slide elevator and adjustable stabilizer in a combined and of rather high aspect ratio, in order to obtain a large amount of stability with sensitive control. The aileron is hinged with brass pins of simple areas to maintain proper wear and are secured by cables in conventional manner, only two pulleys appearing in the entire mechanism.

Seating Arrangement

The rear cockpit is designed for the pilot, and is fitted with a complete set of instruments as well as all engine, radiation, fuel and oil flying controls. Double elevator system is directly connected to the stick, while a torque tube with push and pull rod when it passes under the floor boards to the forward seat.

The rear cockpit is arranged with engine and flying controls for dual training, but both rudder bar and stick can be readily moved to a common plate ending over the opening in the floor and leaving a roomy seat for the two passengers, placed conveniently side by side, without possibility of interfering with the flying control. Ample leg room is provided in the forward seat, while a large locker under the forward floor boards allows space for tools and supplies.

Power Plant

The 12 and 16 h.p. tanks are located between the spars of the upper wing—secured as to the periphery in place, but removable, and supported by struts in such a way that they are readily re-



Welded steel tube fuselage used on the Huff-Daland Petrel 4 and TW5

moved for cleaning and repair. Crankcase is piped down the fuselage from a central valve and standard air service struts are located in front of the fuel tank and thence to the crankcase—a single service feed throughout. No gasoline reaches the engine and the fire hazard due to leaks or serious cracks is practically eliminated. A direct cooling system that is not located beneath the upper wing.

The motor is supported on wooden blocks bolted into a 16-in. by 16-in. bed, the radiator sitting on heavily padded wooden blocks on either side of the propeller. U. S. Certificate No. 1483 states that the engine is of standard construction. The fuel system can be removed without disturbing cooling in place, and has been detached and replaced by one man in less than an hour's time. The engine rest is made up in



Huff-Daland TW5 military training plane (100 hp. Wright E2 engine)

two gears, severely feathered with a patented clip and can be completely removed in one minute, exposing the oil tank, magnetos, wire lines and all parts of the motor in a completely accessible position.

SPECIFICATIONS AND PERFORMANCE

Span, upper wing	27 ft. 1 in.	Maximum speed	141 mi. hr.
Span, lower wing	27 ft. 1 in.	Climb to 5000 ft.	14 min.
Wing area, upper	248 sq. ft.	Top speed	2400 ft. per min.
Wing area, lower	248 sq. ft.	Engine	100 hp. Wright E2
Empty weight	1000 lb.	Fuel capacity	40 gal.
Gross weight	1150 lb.	Consumption	100 mi. at 100 mi. hr.

Progress in Helicopters

Since April 1, 1934, the International Aeronautic Federation recognizes officially records made with helicopters, and the first American helicopter pilot, who is now engaged in a friendly dash to beat each other's performance.

Alfred Geniesse became the first holder of an official helicopter record when on April 17, at Valenciennes, France, he made a looped flight of 525 meters (1722 ft.) in a direct line. The record was beaten by the Marquis Poyaud of Pau on April 18, when at Bay-le-Macdonald aerodrome, near Pau, he made a horizontal flight in a straight line, covering a distance of 735 meters (2411 ft.). The time taken was 4 min. 33 sec., and the machine remained steadily over 6 ft. above the ground. The best previous performance of this nature was a 500 m. flight, made in January.

The Max 5 Geniesse personally set the first record flight in the world of a direct flight, covering a triangular course in 4 min. 40 sec. With this flight, which was controlled by the automatic action of the gyroscopic servos, Geniesse was a point of 90,000 francs offered by the French air department for the first one-kilometer circuit made by a helicopter.

Entries for the international helicopter competition for the French Air Ministry's prize of 250,000 francs April 30 last. There are between fifteen and twenty entries, including some of the best known experts of helicopter construction. It is understood that André Herpin, the famous American pioneer of direct flying, as well as Geniesse and Poyaud have entered machines. Louis Bressan, the French helicopter expert, who has made many successful flights with his "Cyclops" series, is however, in the opinion of the French, a special arrangement between this inventor and the British air ministry.

The progress of the competition is extremely difficult, considering the above records. To win the prize the following performances are required of a helicopter. First, certainly to 2000 ft. altitude, lower three for half an hour and then to 3000 ft. altitude, lower three for half an hour at 40 m. per hr., make a gliding flight from 300 ft. altitude up the engine stopped and land on a small area. The difficulties involved in these performances will be seen from the fact that no free helicopter ever rose higher than 30 ft. from the ground, although the Austrian captain helicopter, Kerschmann and Petrius, did ascend to 350 ft., that no helicopter ever made a gliding flight with the engine stopped or any other particular maneuver, and that the greatest horizontal speed ever made by a helicopter is about 6 m. per hr., one task that required in the competition.



Huff-Daland "Petrel 4" commercial three-seater (100 hp. Wright E2 engine)

to be found in the entire machine, Petrel 4 is felt to be an added advancement in the field of commercial aviation where high speed and performance are required for fast cross-country flying, photography, smoke weaving and similar forms of industrial activity. Such according to Air Service specifications for advanced training machines, the Petrel 4 is equipped by static and flying tests to meet the requirements of hard landings and rough air work in aerobatic schools. It will be noted from the following description that unusual attention has been paid to the problem of simple maintenance under severe use.

Standard installation consists of the Wright E2 motor rated at 100 hp., but developing well in excess of 200 hp. under service conditions, and controlled to be one of the most reliable power plants the industry has yet produced. The older models at 100 and 240 hp. Wright Hispano and the Hispano-Suiza motors are offered as an alternate installation, where their availability or less initial cost make them the desirable motor to use.

Fuselage

A further development of all-steel tubular welded construction is presented in this machine, in which a complete stress load out from the stern post to motor mount, is obtained. The light wooden floor work for battle decks and seating has been entirely eliminated, and the side roof and padding is fused directly upon tubular structure covering each cockpit.

As in the earlier Huff-Daland planes, landing wires have been replaced everywhere with stout monorails, passing parallel along each side of the fuselage and permitting the wheels to rise and set without interference of any kind.

tail gear or wheels. Standard 100 h.p. wheels are provided as an added convenience in with field training.

Shock absorbers are carried on the upper and of a telescoping tube, clear of all contact with dirt and oil, and wood or wearable seats which can be detached and strapped to the floor if desired. Four large lockers under the floor boards, which have been removed and replaced in less than twenty minutes after raising the fuselage above the floor.

A reversible tail skid is provided, making ground or non-reversible manner and arranged to retract freely when being on the ground. Shock absorbers are attached with bolts, and the whole unit can be withdrawn by removing one 1/2 in. bolt and one screw pin which hold the safety chain over a pin.

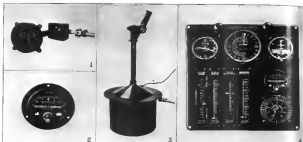
Wings

From a structural standpoint, Petrel Model 4 adheres closely to standard Huff-Daland cantilever biplane practice. Each wing is a unit in itself and is built upon monorails, but open, with open flanges and double diagonal upper glider ribs. The wing curve has been changed to the CRAN, forming a taper in both plan and side section, with a large increase in the useful strength into over the tapered type. The new reasonable feature, however, is the removal of ribs of the structure and the extreme maneuverability and speed now is lateral control, which is due to a large extent to the reduction in weight and area at the tip.

By having in addition to the previous types, a casting of adjustable steel tubes under load with wood or metal stabilizing the use of external wires. Flying tubes for the rear bars are swept forward to the fuselage, leaving a clear way to front of the passenger cockpit and permitting the pilot to see and set without interference of any kind.

The Pioneer Earth Inductor Compass

Description of New Instrument Used by American World Flyers in Spanning Pacific from Alaska to Japan



The Pioneer Earth Inductor Compass—1, controller; 2, motor; 3, generator; 4, Pioneer instrument board, with the motor and controller for the earth inductor compass mounted on the lower right hand corner

The most rapid of all theories plots in making successful long cross-country flights are or through the clouds has secured such interest in the Earth Inductor Compass, which has made these facts possible. We are pleased to be able to give our readers the following description and explanation of this revolutionary instrument.

Fundamentally, there are but two means of determining direction on the earth's surface, reliance of astronomical observations. These are, first, the rotation of the earth on its axis, upon which is based the gyroscopic compass, and second, the magnetic lines of the earth, which are used by the ordinary magnetic compass and by the earth inductor compass.

Principles of the Compass

The ordinary magnetic compass obtains its cue or more important needles supported on a pivot in such a way that they may align themselves with the earth's magnetic lines. The earth inductor compass operates by the rotation of a coil in the earth's field with the resulting generation of electric potential. The determination of the direction of the earth's lines by this method is not new, but it has remained for the Pioneer Instrument Company to produce a practical aircraft compass upon this principle.

The definition of being an ordinary magnetic compass on aircraft may well be known. A location within view of the pilot is usually subject to variable local magnetic fields, making compass readings unreliable under the circumstances in terrestrial flight. The situation of the compass read in the air is further worsened.

In the Pioneer Inductor Compass the above difficulties are wholly avoided. The cue compass depends for its direction upon the earth's magnetic field, but here reads all variations in the constant magnetic compass.

The components of the Pioneer Compass are shown schematically in Fig. 3. They are the generator G, the

controller C and the inductor or motor M. The generator, which is illustrated in Fig. 3, is driven by an air engine. It may, however, be driven by a small electric motor. The generator is similar in principle to any electric generator. It has an armature and brushes, but depends upon the earth's magnetic field for a field. The potential generated is likewise dependent upon the position of the brushes in respect to the earth's magnetic lines.

The controller, shown in Fig. 1, is simply an angle indicator, having a card similar to a compass, and a crank for rotating the card. As many dots, graduated to angle degrees, provide accurate setting. The controller is mechanically connected to the armature of the generator, the rotation of the controller moving the brushes through the same angle as that through which the controller card is turned. The card (Fig. 2) is similar to an ordinary pilot's card. It is electrically connected to the brushes of the generator.

How the Instrument Operates

The operation of the Earth Inductor Compass is a very simple. The controller is rotated to indicate the desired heading. This rotates the brushes of the generator into such a position that there will be no flow of current when the aircraft is headed in the direction indicated. The pilot naturally knows his ship until the motor hand comes to zero. By turning to zero to keep the hand on zero the proper heading is maintained. To change to a new course, the controller is rotated so that the proper heading is indicated on the dial and the pilot then turns the aircraft until the motor hand again comes to zero.

Additional controllers or motors may be installed to permit the direction of the pilot by a compass officer, or to give the full use of the compass to each of two pilots.

As a heading can be selected for the electro-magnetic field is relatively free from local magnetic fields, or as from

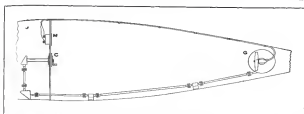


Fig. Diagram showing arrangement of the Pioneer Earth Inductor Compass in an airplane fuselage—C, controller; G, generator; M, motor

the air are reduced to a minimum, and vibration has no appreciable effect since there is no element comparable with the coil of a magnetic compass which is subject to vibration.

The Pioneer Earth Inductor Compass already can be equipped with much greater ease and accuracy than with an ordinary compass. The new instrument has been used on such flights by the Army Air Service and the airplanes in the World Cruise are equipped with it.

The Earth Inductor Compass is the invention of Morris W. Thompson, the Chief Engineer of the Pioneer Instrument Co., who has spent several years upon its design and development.

The D.H. Automatic Camber Gear

The camber flap, that is, automatic extending the wing tips in the air, have long been used in Europe for the purpose of increasing the speed range of airplanes by altering the camber of the wings. The Ferry Co. of England, in particular, has been using such a device for many years with considerable success on all its sea and land planes. In the Ferry camber gear the flaps are operated by the pilot from the cockpit by means of a hand wheel.

The D.H. Automatic Camber Gear has now produced a device which does the wing camber in flight automatically, that is without requiring any attention of the pilot's. This device was recently demonstrated in England, mounted on a DH500 prototype plane fitted with a 700 by 500-hp. Pratt engine, and it gave some remarkable results. Owing to the automatic nature of the mechanism employed in the D.H. automatic camber gear it is not yet available, but the principle which follows off enable us readers to get a general idea of the way and of the results it produces.

The D.H. automatic camber gear consists of two flaps which can be raised or lowered, except that they extend the camber of the wings. When the machine is at rest, the wings hold the flaps down at an angle of approximately 10 deg. to the normal position corresponding to high speed flight. The flaps remain in this position until the air speed of the machine rises to a moderately high figure—70 or so per hour. As the speed continues to increase, they are so raised that they come straight in line with the rest of the wing.

In this position the flaps in line with the rest of the wing section, that is, the wing section becomes normal, so that the high speed of the airplane is not affected by the extra drag for the mechanical addition of weight of the flaps, which is quite light.

The trials of the DH500 showed that the automatic camber gear reduced the landing speed by about 10 m.p.h.

(From 45 to 32 m.p.h.), while the ship attained considerable speed to 50 m.p.h. instead of 30 m.p.h. It was revealed that the attitude of the fuselage changed very little over the entire speed range, and remained practically level down to landing speed. This is easy to understand, for the pulling down of the flaps not only changes the camber of the wing but its angle of incidence as well, which naturally corresponds to pulling up the nose of an ordinary airplane. The steadiness of the fuselage resulting from automatic camber should prove of considerable value on landing by improving the range of vision from the cockpit.

The correspondent of Flight, in reporting these tests, writes: "Even as approaching the airfield when about to land, the tail remained nearly horizontal, and the speed at which the airframe was approached seemed ridiculously low, especially when taken in comparison with the level fuselage. As a matter of fact, the feeling of floating into an airfield at about 45 m.p.h. air speed with the tail still well up is wholly defied, and gives a sense of security that must be experienced to be appreciated. On approach to the ground the machine dropped its forward speed to 30 m.p.h. in its own length, the flaps, then right down, and the whole wing at a large angle, acting as a very efficient air brake."

Another point which was noted on trials of the automatically cambered DH500 was that while the rate of climb remained the same, the angle of climb was considerably improved. That is to say, while it took the machine the same amount of time to reach a given altitude, the automatically cambered plane reached that height at a steeper angle, or in a lesser distance from the starting point, than a normally controlled airplane.

Argentine World Flight Plans

Mrs. Piedad Zanni, the Argentine military aviator who is planning a flight around the world, and who is now in England, does not expect to be able to start her journey before the end of June. She assumed that her world flight, the example of Lord D'Almeida's, the French hero, and do not little resting and a great deal of flying.

As a result of his observation of the flights of the other round-the-world aviators, Blaise Zanni has decided to alter his plan so that the journey from Egypt to Japan will be made in a fortnight, thus sparing the aviator the anxiety of spending much time in the barren zone.

Work on the airplane ordered by the Argentinean has been temporarily halted awaiting new engineers in a contract with the contracting company. The construction of the last of the airplanes is well advanced.

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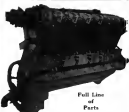
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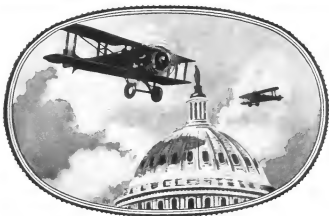
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Hopping Across Continents

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